

Claims

1. A transmission having a plurality of gear ratios, selector means for selectively engaging the gear ratios, and a control system including means for measuring deformation caused by torque in the transmission in at least one static component or assembly that is deformed due to torque in the transmission., and means for controlling the torque in the transmission, wherein the control system is arranged to measure deformation and to adjust the torque in the transmission according to the measured deformation and a known relationship between the gear ratios.
2. A transmission according to claim 1, wherein the known relationship is substantially linear and values corresponding to the measured deformation are adjusted by a scaling factor.
3. A transmission according to claim 1 or 2, wherein the control system is arranged to control the rate of change of torque in the transmission in accordance with the deformation measured.
4. A transmission according to any one of the preceding claims, wherein the means for controlling torque in the transmission includes clutch means.
5. A transmission according to any one of the preceding claims, wherein the means for controlling torque in the transmission includes means for controlling the speed of a drive source.
6. A transmission according to any one of the preceding claims, wherein the control system includes means for calculating the magnitude of torque in the transmission system.
7. A transmission system according to any one of the preceding claims, wherein the control system includes estimating means for estimating torque in the transmission when the selector means engages an unengaged gear ratio.

8. A transmission according to any one of the preceding claims, including sensor means for sensing the position of the selector means.
9. A transmission according to any one of the preceding claims, wherein the transmission includes means for identifying fluctuations in the deformation measurements due to factors other than drive line torque.
10. A transmission according to claim 9, wherein the control system is arranged to record a plurality of readings and calculate the difference between the measurements, and to control the torque to account for fluctuations in the deformation measurements.
11. A transmission according to any one of the preceding claims, wherein the control system includes at least one of means for measuring engine speed, means for measuring road speed or a vehicle-mounted accelerometer.
12. A transmission according to any one of the preceding claims, wherein the means for measuring deformation measures the amount of torsional deformation in the component or assembly.
13. A transmission according to any one of the preceding claims, wherein the means for measuring deformation determines the direction of torque in the transmission.
14. A transmission according to any one of the preceding claims, wherein the component or assembly comprises at least one of a transmission bearing, casing, support member, mounting, or mounting bolts.
15. A transmission according to any one of the preceding claims, wherein the means for measuring deformation includes at least one load cell, and preferably a plurality of load cells.
16. A transmission according to any one of the preceding claims, wherein the means for measuring deformation is mounted on a casing having a longitudinal axis and the casing is arranged such that torque in the transmission twistingly deforms the casing about the longitudinal axis.

17. A transmission according to any one of the preceding claims, wherein the means for measuring deformation measures the amount of strain in the component or assembly.

18. A transmission according to claim 17, wherein the means for measuring deformation includes at least one strain gauge.

19. A method for controlling torque in a transmission having a plurality of gear ratios and selector means for selectively engaging the gear ratios, including measuring the deformation caused by torque in at least one component or assembly arranged to support or house rotatable components of the transmission, selecting an unengaged gear ratio, adjusting the torque in the transmission in accordance with the measured deformation and a known relationship between the gear ratios.

20. A method according to claim 19, including controlling the rate of change of torque.

21. A method according to claim 19 or 20, including estimating the amount of torque in the transmission when an unengaged gear ratio will be engaged.

22. A transmission having a plurality of gear ratios, selector means for selectively engaging the gear ratios, including means for measuring deformation caused by torque in the transmission in at least one component or assembly arranged to support or house rotatable components of the transmission.